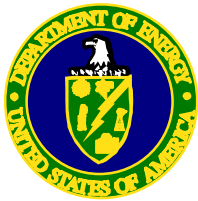




Environmental, Health and Safety (EH&S)

Department of Energy - USA
Ministry of Science & Technology
PRC

August 4-7, 1998, Beijing



General Overview

- EH&S Issues

- » EH&S issues for lead-acid batteries
- » EH&S issues for advanced batteries
 - Shipping
 - Recycling
 - In-vehicle safety



General Overview

- EH&S Cooperative Framework
 - » Federal Government Working Groups
 - Advanced Battery Readiness Working Group
 - » Federal Government Environmental Law and Regulation
 - Environmental Protection Agency (EPA)
 - Department of Transportation (DOT)
 - Occupational Safety and Health Administration (OSHA)



General Overview

- » Infrastructure Working Council (IWC)
- » Society of Automotive Engineers (SAE)



General Overview

- Possible links between U. S. and Chinese regulatory and environmental systems



EH&S Issues



EH&S Issues for Lead-Acid Batteries

- Batteries comprise 81% of U.S. consumption of lead
- New secondary lead recovery capacity needed, partly caused by EV waste
 - » Hydrometallurgical and electrowinning processes being implemented



EH&S Issues for Lead-Acid Batteries

- Air Emission Issues
 - » National Ambient Air Quality Standard (NAAQS) for lead -- 1.5 micrograms/m³ for 3-month average
 - » California Air Resources Board (CARB) Standard -- 1.5 micrograms/m³ for 1-month average



EH&S Issues for Lead-Acid Batteries

- » Maximum Achievable Control Technology standard -- 2.0 mg/dscm (dry standard cubic meter)
- Back-up power systems can be used to ensure continuous emission control during power outage
 - » U. S. plant back-up system can power plant up to one hour



EH&S Issues of Advanced Batteries

- Nickel Metal Hydride, Sodium Nickel Chloride, Lithium Ion, and Lithium Polymer batteries assessed
- Focus today on Nickel Metal Hydride batteries



Nickel Metal Hydride Batteries

- Safety: overcharge/overdischarge tolerance
- Shipping: starved electrolyte
 - » Some are classified as “dry”
- Recycling: classified as non-hazardous by EPA



EH&S Cooperative Environmental and Regulatory Framework



Federal Government Working Groups

- Advanced Battery Readiness Working Group

- » Purpose

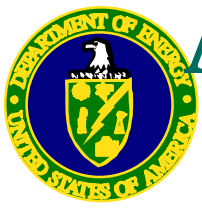
- To act as formally designated advisory body to DOE
- To assess regulatory requirements to ship, recycle, and operate batteries safely
- To develop action plans for commercialization



Advanced Battery Readiness Working Group

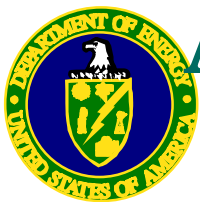
- Participants

- » EPA, Department of Energy (DOE),
Department of Transportation (DOT),
California Air Resources Board (CARB)
- » Automobile industry
- » Battery Industry
- » Electric Power Industry
- » Recycling Industry



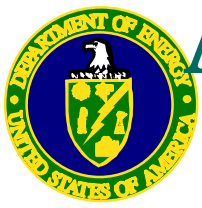
Advanced Battery Readiness Working Group

- Examples of accomplishments
 - » Shipping approvals in place for sodium and nickel - based batteries; proposal accepted by United Nations for lithium batteries



Advanced Battery Readiness Working Group

- Examples of Accomplishments
 - » Recycling advancements made for lithium ion batteries; 98% of lithium, 98% of cobalt, and much of the aluminum, iron, and nickel content recoverable



Advanced Battery Readiness Working Group

- Examples of Accomplishments
 - » Identified safety issues made into standards
 - Issues: chemical exposure due to crash or rollover; failure of battery restraints or containment during crash
 - Standard: Recommended Practice for Electric and Hybrid Vehicle Battery Systems Crash Integrity Testing



Environmental Law and Regulation

- EPA: Clean Air Act
- EPA: Clean Water Act
- EPA: Resource Conservation and Recovery Act
- DOT: Hazardous Materials Shipment Regulations
- OSHA: Permissible Exposure Limits



Infrastructure Working Council

- Purpose

- » Recommend electric vehicle standards
- » Serve as a problem-solving forum for electric vehicle infrastructure
- » Serve as an information exchange between industries



Infrastructure Working Council

● Participants

- » Automobile manufacturers
- » Electric power industry
- » Department of Energy; California Air Resources Board
- » Industry associations
- » Component manufacturers
- » Standards organizations



Infrastructure Working Council

- Health and Safety Committee
 - » Emergency response training materials distribution
 - » 1999 National Electrical Code EV language
 - » 2000 International Building Code EV language
 - » Level 2 field tests complete; plans for Level 3 field tests



Infrastructure Working Council

- Connector and Connecting Stations
 - » Connector standardization
 - » High power charging
 - » Infrastructure development
 - Smart card billing
 - Review of CA and Massachusetts mandates



Infrastructure Working Council

- Load Management, Distribution and Power Quality Committee
 - » Assess EV charging billing methods
 - » Assess installation costs of EV charging infrastructure
 - » Power quality assessment of multiple chargers



Infrastructure Working Council

- Charging Controls and Communications Committee
 - » Model to simulate EV communications and control environment
 - » Development of generic supply equipment controller



Infrastructure Working Council

- Bus / Non-Road Committee
 - » Electric bus charging communications
 - » Electric bus and lift-truck 'fast' charging
 - » Electric bus and non-road vehicle charging connectors
 - » Electric bus and non-road vehicle infrastructure and standards



Society of Automotive Engineers

- Examples of Standards
 - » SAE J1718: Measurement of hydrogen gas during battery charging
 - » SAE J2288: Life cycle testing of EV battery modules
 - » SAE J1673: High voltage automotive wiring assembly design



U. S. and Chinese System Links?

- Cities identified for EV introduction?
 - » National government role?
 - » Local government role?
 - » Electric power industry role?
 - » Recycling capability in place? Can it accommodate vehicles and batteries?
 - » Battery shipping currently taking place?



U. S. and Chinese System Links?

- Applicability of Working Group or Infrastructure Council?
 - » Assemble industry and government to plan for infrastructure
 - » Changes required to existing law or regulation to provide for electric vehicles?
 - Motor vehicle standard
 - Waste disposal/recycling regulations



EH&S Cooperative Environmental and Regulatory Efforts

